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Home Course In Road Making

I.—The Office of Public Roads.

By LOGAN WALLER PAGE,
Director Office of Public Roads,
United States Department of Agriculture

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IN March, 1893, a petition was presented to congress asking that a road department similar to the agricultural department be founded at Washington for the purpose of promoting construction and maintenance of roads and for teaching students so that they might become skilled road engineers and to establish a permanent exhibit of sections of road illustrating various methods of construction and the best road materials and machinery. This petition was signed by the governors of many of the states, including Governor McKinley of Ohio, by chambers of commerce and universities and was indorsed by resolutions of legislatures.

The office of road inquiry was established under authority of an act of



UNITED STATES OFFICE OF PUBLIC ROADS.

congress approved March 3, 1893, making appropriation of \$10,000 for the department of agriculture. The clause relating to this work provided that the secretary of agriculture should make inquiries in regard to systems of road management throughout the United States, make investigations in regard to the best methods of road making, prepare publications on this subject and assist agricultural colleges and experiment stations in disseminating information.

Since 1893 the total amount appropriated for the office of public roads is \$804,960, and since its establishment the office has issued 40 bulletins, 95 circulars, 9 farmers' bulletins, 21 year book reprints and 18 annual reports, a total of 183 publications.

The office has directed the construction of about 340 object lessons and experimental roads, illustrating macadam, bituminous macadam, brick, gravel, sand-clay, shell and earth construction. The approximate expenditure on these object lessons and experimental roads by local authorities has been \$600,762, and the subsequent road work due directly to the object lesson roads represents expenditures running well up into millions. Lectures and personal advice by engineers and experts have constituted a prominent feature of the work of the office since its establishment. The road material laboratory was installed in December, 1900, and from that time to July 1, 1911, about 5,300 samples of road material have been received from practically every state in the Union and tested to determine their character and value for road building.

A photographic laboratory was installed in January, 1900, and has now a complete outfit. This was the direct result of a great need for illustrated lectures. The office has now a collection of about 6,000 negatives and about 3,000 slides, many of which have been colored. These illustrate all phases of road work.

Experiments have been conducted with oils, tars, rock asphalt and various preparations for the purpose of preventing dust and preserving macadam roads from destruction under modern traffic conditions. The office has conducted investigations to determine the feasibility of the sand-clay method of road building in the southern states as well as in the prairie states, and this method of construction has been found to be quite practicable, especially in the south.

A study of the construction of roads, of natural soils by treatment with asphaltic oils, has been made and was published in circular No. 90. The office is conducting investigations on the use of slag as a road material and the improvement of sand roads in parts of the country where clay is not accessible. Practical efforts have been made toward bringing about the more general use of the split log drag in the maintenance of earth roads.

One of the unique and striking exhibits at the Alaska-Yukon-Pacific exposition consisted of a series of miniature models illustrating every known type of improved road and the various

road building devices, such as rollers and crushers, in actual operation. This exhibit was designed and prepared by the office, and since the exposition closed similar exhibits have been shown in many parts of the United States, partly through the medium of expositions and partly by means of exhibit trains operated by several railroads. Lecturers and demonstrators accompany these exhibits, making them in reality schools of instruction in road building.

Graduates in engineering are appointed from colleges each year after a competitive examination, and are given thorough training while rendering practical services to the government. In this way an efficient corps of engineers is being built up, which will aid the development of road building along proper lines, both during and after their connection with the government. This work was begun in the fiscal year 1905.

Investigations into the decomposition of rock powders under the action of water have led to important discoveries with reference to increasing the cementing value of road materials. The investigation into the corrosion of iron and steel culverts has brought out important results. The generally accepted theories regarding the rusting of iron have been demonstrated to be incorrect, and it has been shown that by treating the surface of the iron with a strong oxidizing agent the rusting can be inhibited.

In May, 1907, the office inaugurated a project designed to introduce the best possible systems of construction, maintenance and administration of roads in the various counties. Under this plan engineers are assigned to make thorough investigation on all phases of the road work of the county to which they are assigned, and prepare exhaustive reports giving plans, estimates and recommendations.

The number of the employees of the office has increased from one on July 1, 1893, to 157 on July 1, 1911. The present appropriation of the office is \$100,720, out of which \$3,500 is paid for rent, leaving \$157,220 to pay the salaries of these 157 employees, as well as traveling expenses, the purchase of equipment and supplies, and the usual running expenses.

The most thorough and systematic methods of organization have been introduced into the administration of the office, and the great library on all phases of road work is the best in the western hemisphere, and the library is being added to constantly.

The policy of the office in recent years has been to co-operate with the officials in charge of road work in the various states as closely as possible, and the endeavor is being made so to correlate road work in each state by voluntary co-operation as to constitute one great movement along uniform lines and make the progress and methods of each state known to every other state through the medium of the office. In furtherance of this object a comprehensive investigation was begun in



SECTION OF THE BITUMINOUS LABORATORY OFFICE OF PUBLIC ROADS.

1904 to ascertain the mileage of improved and unimproved roads, the character of improvement, the amounts expended, rates of levy and sources of revenue in every county in the United States. This work was finished in June, 1907, and the results were published in the form of a bulletin, which shows that there are over 2,150,000 miles of road in the United States, of which only 7.14 per cent were improved in 1904, and that the expenditure in money and labor for that year was nearly \$80,000,000. This bulletin comprises the first complete data ever assembled on this subject.

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